# Nitrogen Dynamics in the Holocene Euxinic Black Sea

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The Black Sea, euxinic for the past 7600 years, has been proposed as a possible chemical analogue for the transitional Proterozoic ocean between the anoxic, non-sulfidic conditions of the Archaean and the oxic, sulfate-rich conditions of the Phanerozoic ocean. Biogeochemical nutrient cycling in such environments is distinct from modern oceans as the primary redox reactions occur within the water column. Evidence of changes in nutrient utilization in such environments can be inferred from analysis of the preserved sedimentary organic matter. In particular, this study draws on published biomarker data, along with new high resolution nitrogen and carbon percent composition and isotopic data, to connect changes in the mechanisms of nitrogen cycling in the Black Sea to chemocline depth variations.

The results of this study reveal relatively depleted _$^{15}$N values from -1‰ to +1.5‰ for most of the Holocene, separated by positive excursions within the unit II sapropel and the unit I carbonate-rich interval (_$^{15}$N between +3‰ and +4‰). _$^{13}$C values suggest a primarily marine source for organic matter throughout units I and II; thus, assuming a relatively constant _$^{15}$N for nitrogen riverine influx, changes in _$^{15}$N are due primarily to marine activity. We believe the higher _$^{15}$N values were caused by increased influence of coupled nitrification and denitrification, and anaerobic ammonium oxidation. The depleted _$^{15}$N values, lower than most marine sedimentary values, reflect preferential assimilation of isotopically light ammonium released from the anoxic sediments and the possible influence of temporally variable nitrogen fixation.